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of its acquisitions, but works with the greatest clearness and effect, when engaged in the most discursive and far-reaching investigations. Those who differ from him most widely in opinion may still follow with profit the steps of his inquiry, and derive instruction from its results. We look forward with great interest to the appearance of the concluding part of the work, which will relate to the internal evidences of the genuineness of the Gospels.

Art. VIII. — 1. *The North American Sylva; or a Description of the Forest Trees of the United States, Canada, and Nova Scotia, considered particularly with Respect to their Use in the Arts, and their Introduction into Commerce; to which is added a Description of the most useful of the European Forest Trees; illustrated by* 156 *colored Engravings: translated from the French of* F. Andrew Michaux. Second Edition. 3 vols. imp. 8vo. New Harmony, Indiana, 1840.

2. *The North American Sylva; or a Description of the Forest Trees of the United States, Canada, and Nova Scotia, not described in the Work of F. Andrew Michaux, and containing all the Forest Trees discovered in the Rocky Mountains, the Territory of Oregon down to the Shores of the Pacific and into the Confines of California, as well as in various Parts of the United States; illustrated by* 122 *fine Plates.* By Thomas Nuttall, F. L. S., &c. In 3 volumes, imp. 8vo. Philadelphia: J. Dobson. Vol. I. 1842-3. pp. 136.

3. *Arboretum et Fruticetum Britannicum; or the Trees and Shrubs of Britain, Native and Foreign, Hardy and Half-hardy, pictorially and botanically delineated, and scientifically and popularly described, with their Propagation, Culture, Management, and Uses in the Arts, in useful and ornamental Plantations, and in Landscape Gardening; preceded by a historical and geographical Outline of the Trees and Shrubs of Temperate Climates throughout the World.* By J. C. Loudon, F. L. & H. S., &c. In 8 vols: 4 of letter-press, illustrated by above 2500 Engravings, and 4 of Plates. London: Printed for the Author. 1838. 8vo. pp. 2694.

4. *An Encyclopædia of Trees and Shrubs; being the Arboretum et Fruticetum Britannicum abridged; or the Hardy Trees and Shrubs of Britain, Native and Foreign, scientifically and popularly described; with Figures of nearly all the Species.* By J. C. Loudon, F. L. S., &c. London: Printed for the Author. 1841–2. 8vo. pp. 1162.
5. *Notice sur la Longévité des Arbres.* Par Aug. Pyr. de Candolle; in the *Bibliothèque Universelle.* May, 1831.

The *Histoire des Arbres Forestières de l'Amérique Septentrionale* of the younger Michaux is chiefly known in this country through the English translation made by Mr. Hillhouse, under the superintendence of the author, who added some new plates, and information not contained in the French edition. It was published in Paris, in the year 1819, under the slightly modified title which we have placed at the head of this article. We have no intention of formally reviewing, at this late day, a work of such long-established reputation as the Sylva of Michaux. It has been the standard treatise upon the subject ever since its publication; and it well deserves the rank it holds. We wish rather to offer our grateful acknowledgments to the memory of the late Mr. William Maclure, for his liberal endeavours to render this important and quite expensive work more generally accessible in the country, the noble forests of which it is designed to illustrate. In furtherance of this object, Mr. Maclure, if we are rightly informed, purchased in Paris the copies which remained unsold the year after its publication, and sold them in the United States at a very reduced price. With liberal forethought, he bought, also, the original copper-plates of this book, and of several other expensive works of science and art; intending to have them reprinted in this country in a cheaper form, so as to insure them a wider circulation.* During the last twelve years of his life, or from the time of the total failure of the *great social experiment* made at New Harmony, Indiana, by the celebrated Robert Owen and himself, down to his decease in 1840, Mr. Maclure resided in the city of Mexico. The great interest, which he still felt in the advancement and diffusion of scientific knowledge in this country, was manifested by his continued and munificent benefactions to the Academy of Natural Sciences at Philadelphia.* It was his desire, also, that some competent person, at his expense, should collect additional information respecting the forest trees of North America, and prepare a new and augmented edition of Michaux's Sylva. Although this generous plan was not carried into execution in Mr. Maclure's lifetime, we understand that he left testamentary instructions for its accomplishment, or at least for the reprint of Michaux's original work.

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* Among these are the complete copper-plates of Veillot's *Histoire Naturelle des Oiseaux, de l'Amérique Septentrionale;* and Audebert's *Histoire Naturelle des Oiseaux,* etc.

Mr. Maclure's munificent intentions are — fulfilled, shall we say ? by the edition now before us, printed at New Harmony, Indiana, upon wretched, flimsy, whity-brown paper, of texture scarcely firm enough to receive the impression of the worn-out type, which seems to have done long service in the columns of some country newspaper. The engravings, to do the work full justice, are very good, at least in the colored copies; being impressions from the original plates imported by Mr. Maclure, and colored after the French edition. The subscription price was high enough to pay for the best typography and paper ; and so popular a work would surely have found a ready sale at any reasonable price, as the Paris edition had been long out of print. We are bound to suppose, that the testamentary instructions of the late Mr. Maclure have been *literally* fulfilled. How far his generous intentions have been answered, or to what extent defeated, by the wretched character of the reprint, are questions which we shall not attempt to answer, except by stating, that, far from having obtained the wide circulation which Mr. Maclure desired, these volumes have entirely disappeared from the shelves of our booksellers, where, so far as we can learn, there was no demand for them ; and our diligent attempt to find a single copy in the public and private libraries of three of our largest cities has proved entirely unsuccessful.

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* Besides his invaluable library of nearly 4,000 volumes, containing the choicest works in Natural History, Antiquities, the Fine Arts, Voyages and Travels, &c., and many smaller contributions to this flourishing institution, of which he was President for more than twenty years, Mr. Maclure presented to it, in the latter part of his life, the sum of twenty thousand dollars. See Dr. Morton's *Memoir of Wm. Maclure:* Philadelphia, 1841.

The foundation of the North American Sylva was laid by the laborious researches of the elder Michaux; who, under the auspices of the French government, devoted ten years, from 1785 to 1796, to a thorough exploration of the country, from the sunny, sub-tropical groves of Florida to the cold and inhospitable shores of Hudson's Bay; repeatedly visiting nearly all the higher peaks and deepest recesses of the Alleghany Mountains, and extending his toilsome journeys westward to the prairies of Illinois and the banks of the Mississippi. He had formed indeed, and was only prevented by untoward circumstances from executing, a plan — more hardy than we can well conceive at this late day — for ascending the Missouri to its sources, and crossing the mountains into the then untrodden, but now litigated, country on the Oregon. The curious reader will find an extract from his private diary in the American Journal of Science and Arts for January, 1842;* showing that he had laid his plans and proposals upon this subject before Mr. Jefferson, who was then Secretary of State. The papers submitted by him may have suggested the scheme of the national expedition of discovery, soon afterwards ordered by Jefferson, and nobly carried into effect by Lewis and Clarke.

Soon after his return to France, and the year before he fell a victim to scientific zeal upon the coast of Madagascar, the elder Michaux published his History of North American Oaks;† which may be deemed the nucleus of the more comprehensive work subsequently published by his son. The younger Michaux accompanied his father in the earlier portion of his travels, through South Carolina, Georgia, and Florida; but he afterwards returned to Europe. Revisiting this country in the autumn of 1801, and passing the winter in South Carolina, he travelled, during the following season, from New York, across the mountains in Pennsylvania, to the Ohio, and carefully explored the States of Kentucky and Tennessee; thence, recrossing the mountains in North Carolina to Charleston, he again embarked for France.‡

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* Vol. XLII. p. 7.

† *Histoire des Chênes de l'Amérique Septentrionale,* par A. Michaux. Paris: 1801. 1 vol. fol.

‡ The observations made in this tour are recorded in his "*Voyages à l'Ouest de Monts Alléghanys,*" 8vo. Paris, 1804; and in a "*Mémoire sur la Naturalization des Arbres Forestières de l'Amérique Septentrionale.*" 8vo. Paris, 1805.

Again returning in 1807, he journeyed along the whole extent of our Atlantic coast, and visited the principal ports, to examine the timber employed in ship-building and in workshops of every description ; besides making separate excursions into the interior : "the first, along the Rivers Kennebec and Sandy, passing through Hallowell, Norridgewock, and Farmington ; the second, from Boston to Lake Champlain ; the third, from New York to the Lakes Ontario and Erie ; the fourth, from Philadelphia to the borders of the Rivers Monongahela, Alleghany, and Ohio ; and the fifth, from Charleston to the sources of the Savannah and Oconee." Having thus faithfully collected the requisite information, his great work upon our forest trees — the fruit of so much labor — was published at Paris in 1810 – 13.

But this work is not the only result of the well directed industry and zeal of the elder and the younger Michaux. To these two persons, chiefly, are the French plantations indebted for their surpassingly rich collections of American trees and shrubs ; which long since gave rise to the remark, as true at this day as it was twenty years ago, that an American must visit France to see the productions of his native forests. When shall it be said, that the statement is no longer true ? When shall we be able to point to a complete, or even a respectable, American collection of our indigenous trees and shrubs ?

A few words will suffice for the second work on our list. Mr. Nuttall, it appears, first arrived in this country the very year that the younger Michaux finally left it. And from that time to the present, no botanist has visited so large a portion of the United States, or made such an amount of observations in the field and forest. Probably few naturalists have ever excelled him in aptitude for such observations, in quickness of eye, tact in discrimination, and tenacity of memory. In some of these respects, perhaps, he may have been equalled by Rafinesque, — and there are obvious points of resemblance between the later writings of the two, which might tempt us to continue the parallel ; — but in scientific knowledge and judgment, he was always greatly superior to that eccentric individual. Mr. Nuttall has also enjoyed the best opportunities for exploring the wide regions beyond the Mississippi. In 1811, along with Mr. Bradbury, he ascended the Missouri to the Mandan villages, 1,600 miles above its mouth; and shortly after his return, published his extended and most happily executed botanical work, the "Genera of North American Plants." In 1819, at the imminent risk of his life, he ascended the Arkansas to the Great Salt River. And, in 1834, he finally succeeded in crossing the Rocky Mountains by the now well trodden road along the sources of the Platte, and exploring the territory of Oregon and of Upper California. Mr. Nuttall was therefore peculiarly qualified for the preparation of a supplementary North American Sylva, designed especially to comprise the forest trees of these wide regions, which are now, for obvious reasons, attracting particular attention.

The work, according to the announcement on the title-page, will consist of three volumes; and we understand that the editor committed the whole manuscript to the publisher's hands more than two years ago, when he returned to his native country, to take possession of an ample family inheritance. But from some cause, the publication has been greatly delayed; only one volume having yet appeared, and that in two portions, of which the first bears the date of 1842, while the second has but just reached us. We postpone all critical remarks until the entire publication is completed; merely observing, lest the interests of the publisher should suffer from the nominal connection between this work and the New Harmony reprint of the original Sylva, that the paper and typography are good, and the plates, which are colored lithographs, are respectable. Meanwhile the interest of the subject, and the well known scientific character of the author, will commend the work to general attention and patronage.

The plan and object of the late Mr. Loudon's greatest work, the "Arboretum et Fruticetum Britannicum," is fully set forth in the copious title-page, for which we have found room at the head of this article. All its promises are more than redeemed in the execution of the work, which is truly a fine monument of industry and careful research. We have particular reasons, which will appear in the sequel, for commending this work to the notice of any readers interested in these subjects, who do not already possess it. By purchasing a copy of it, or of the valuable abridgment, the "Encyclopædia of Trees and Shrubs," a work of moderate price, they will render important aid to the embarrassed family of the author. To give some idea of the astonishing industry of the late Mr. Loudon in the preparation of scientific books, we extract the following account from the "Gardeners' Magazine," an excellent periodical, the publication of which, after it had continued for a period of eighteen years, terminated at the death of its indefatigable editor.

"Mr. Loudon was brought up as a landscape-gardener, and began to practise in 1808, when he came to England with numerous letters of introduction to some of the first landed proprietors in the kingdom. He afterwards took a large farm in Oxfordshire, where he resided in 1809. In the years 1813, 1814, 1815, he made the tour of Northern Europe, traversing Sweden, Russia, Poland, and Austria; in 1819, he travelled through Italy, and in 1828, through France and Germany. Mr. Loudon's career as an author began in 1803, when he was only twenty years old; and it continued, with very little interruption, during the space of forty years, being only concluded by his death. The first works he published were the following: — 'Observations on laying out Public Squares,' in 1803, and on 'Plantations,' in 1804; a 'Treatise on Hothouses,' in 1805, and on 'Country Residences,' in 1806, both 4to.; 'Hints on the Formation of Gardens,' in 1812; and three works on 'Hothouses,' in 1817 and 1818. In 1822, appeared the first edition of the 'Encyclopædia of Gardening'; a work remarkable for the immense mass of useful matter which it contained, and for the then unusual circumstance of a great quantity of woodcuts being mingled with the text: this book obtained an extraordinary sale, and fully established his fame as an author. Soon after was published an anonymous work, written either partly or entirely by Mr. Loudon, called the 'Greenhouse Companion'; and shortly afterwards, 'Observations on laying out Farms,' in folio, with his name. In 1824, a second edition of the 'Encyclopædia of Gardening' was published, with very great alterations and improvements; and the following year, appeared the first edition of the 'Encyclopædia of Agriculture.' In 1826, the 'Gardeners' Magazine' was commenced, being the first periodical ever devoted exclusively to horticultural subjects. The 'Magazine of Natural History,' also the first of its kind, was begun in 1828. Mr. Loudon was now occupied in the preparation of the 'Encyclopædia of Plants,' which was published early in 1829, and was speedily followed by the 'Hortus Britannicus.' In 1830, a second and nearly rewritten edition of the 'Encyclopædia of Agriculture' was published, and this was followed by an entirely rewritten edition of the 'Encyclopædia of Gardening,' in 1831; and the 'Encyclopædia of Cottage, Farm, and Villa Architecture,' the first he published on his own account, in 1832. This last work was one of the most successful, because it was one of the most useful, he ever wrote, and it is likely long to continue a standard book on the subject of which it treats. Mr. Loudon now began to prepare his great and ruinous work, the 'Arboretum Britannicum,' the anxieties attendant on which were, undoubtedly, the primary cause of that decay of constitution which terminated in his death. This work was not, however, completed till 1838, and in the mean time he began the 'Architectural Magazine,' the first periodical devoted exclusively to architecture. The labor he underwent at this time is almost incredible. He had four periodicals, viz., the 'Gardeners',' 'Natural History,' and 'Architectural Magazines,' and the 'Arboretum Britannicum,' which was published in monthly numbers, going on at the same time; and, to produce these at the proper times, he literally worked night and day. Immediately on the conclusion of the 'Arboretum Britannicum,' he began the 'Suburban Gardener,' which was also published in 1838, as was the 'Hortus Lignosus Londinensis'; and in 1839, appeared his edition of Repton's 'Landscape Gardening.' In 1840, he accepted the editorship of the 'Gardeners' Gazette,' which he retained till November, 1841; and in 1842, he published his 'Encyclopædia of Trees and Shrubs.' In the same year, he completed his 'Suburban Horticulturist'; and finally, in 1843, he published his work on 'Cemeteries,' the last separate work he ever wrote. In this list, many minor productions of Mr. Loudon's pen have necessarily been omitted; but it may be mentioned, that he contributed to the 'Encyclopædia Britannica,' and Brande's 'Dictionary of Science'; and that he published numerous supplements, from time to time, to his various works."

The adverse circumstances under which all this labor was performed make the result appear still more remarkable. Early in life, an attack of inflammatory rheumatism permanently stiffened one of his knees and contracted his left arm. In 1820, his right arm was broken near the shoulder, and the bones were never properly united. But he still continued to write with his right hand until 1825, when the arm was broken a second time, and it became necessary to amputate it; after which, having about this time lost the use of the thumb and two fingers of the left hand, he was obliged to employ amanuenses. It was under these trying circumstances, that his great " Arboretum " was prepared. The work was undertaken against the advice of his publishers and friends, who foresaw that it would wholly absorb his former earnings. But it was his favorite and crowning work, and he unflinchingly carried it onward to completion ; though the result verified the predictions of his advisers. It cost ten thousand pounds sterling ; and the whole proceeds of the sale, as well as the copy-rights of his other works, were pledged to the publishers for payment. It is gratifying to learn, that, since the writer's decease, an appeal has been made to the public in England, and with great success, to purchase copies of this work and of the other publications of Mr. Loudon, so that the copyrights may be redeemed, and their future proceeds applied to the benefit of his surviving family. The subjects of landscape gardening and arboriculture are attracting increased attention in the United States, and these valuable treatises are not yet so generally known as they deserve to be ; we have thought it proper, therefore, to make this statement.

While systematically treating of the botanical character, propagation, management, and economical uses of trees, Mr. Loudon has interwoven a vast amount of curious matter respecting their history, geography, and literature. Being himself a distinguished landscape-gardener, he has successfully treated of their character and adaptation as component parts of general scenery, of which they form a most important element ; for no other constituents — no lifeless objects — produce impressions at once so strong and so widely varied as trees. He has also collected interesting statistics respecting the longevity of trees ; — a subject upon which we intend to task the patience of our readers to some extent.

The most interesting ideas connected with trees are those suggested by their stability and duration. They far outlast all other living things, and form the familiar and appropriate symbols of long-protracted existence. " As the days of a tree shall be the days of my people " is one of the most beautiful and striking figures under which a blessing can be conveyed. We are naturally led to inquire, whether there is any absolute limit to their existence. If not destroyed by accident, — that is, by extrinsic causes, of whatever sort, — do trees eventually perish, like ourselves, from old age ? It is commonly thought, no doubt, that trees are fully exposed to the inevitable fate of all other living things. The opposite opinion seems to involve a paradox, and to be contradicted by every one's observation. But popular opinion is an unsafe guide; — the more so in this case, as our ordinary conceptions on the subject spring from a false analogy, which we have unconsciously established, between plants and animals. This common analogy might, perhaps, hold good, if the tree were actually formed like the animal, all the parts of which are created at once in their rudimentary state, and soon attain their fullest development, so that the functions are carried on, throughout life, in the same set of organs. If this were the case with the tree, it would likewise die, sooner or later, of old age, — would perish from causes strictly analogous to those which fix a natural limit to the life of animals. The unavoidable induration and incrustation of its cells and vessels, apart from other causes, would put an early and sure limit to the life of the tree, just as it does in fact terminate the existence of the leaf, the proper emblem of mortality, — which, although it generally lives only a single season, may yet truly be said to die of old age. But as the leaves are necessarily renewed every year, so also are the other essential organs of the plant. The tree is gradually developed by the successive addition of new parts. It annually renews not only its buds and leaves, but its wood and its roots; every thing, indeed, that is concerned in its life and growth. Thus, like the fabled Æson, being restored from the decrepitude of age to the bloom of early youth, — the most recent branchlets being placed, by means of the latest layer of wood, in favorable communication with the newly formed roots, and these extending at a corresponding rate into fresh soil, —

> "Quæ quantum vertice ad auras
> Ætherias, tantum radice in Tartara tendit," —

why has not the tree all the conditions of existence in the thousandth, that it possessed in the hundredth, or the tenth, year of its age? The old and central part of the trunk may, indeed, decay; but this is of little moment, so long as new layers are regularly formed at the circumference. The tree survives; and it is difficult to show that it is liable to death from old age in any proper sense of the term. Nor do we arrive at a different conclusion, when we contemplate the tree under a less familiar, but more philosophical, aspect, — considering it, not as a simple individual, like man or the higher animals, but as an aggregate of many individuals, which, though ordinarily connected with the parent stock, are capable of growing by themselves, and indeed often do separate spontaneously, and in a variety of ways acquire independent existence. If, then, the tree be, as it undeniably is, a complex being, an aggregate of as many individuals, united in a common trunk, as there are, or have been, buds developed on its surface; and if the component individuals be annually renewed, why should not the aggregate, the *tree*, last indefinitely? To establish a proper analogy, we must not compare the tree with man, but with the coral formations, in which numberless individuals, engrafted and blended on a common base, though capable of living when detached from the mass, conspire to build up those arborescent structures, so puzzling to the older naturalists, that they were not inappropriately named "zoophytes," or *animal-plants.* The immense coral-groves, which have thus grown up in tropical seas, have, no doubt, endured for ages; the inner and older parts consisting of the untenanted cells of individuals that have long since perished, while fresh structures are continually produced on the surface. The individuals, indeed, perish; but the aggregate may endure as long as time itself. So with a tree, considered under this point of view. Though the wood in the centre of the trunk and large branches — the produce of buds and leaves that have long ago disappeared — may die and decay; yet while new individuals are formed upon the surface with each successive crop of fresh buds, and placed in as favorable communication with the soil and the air as their predecessors, the aggregate tree would appear to have no necessary, no inherent, limit to its existence.*

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* A beautiful confirmation of this view may be drawn from the celebrated Banyan, or India Fig-tree, and a few other tropical trees, which freely strike root, high in the open air, from their spreading branches. These aërial roots, after reaching the earth, become in time new trunks; and the whole tree appears like a huge tent, supported by many columns. Milton's description of the Banyan (in "Paradise Lost") is incorrect, so far as it supposes the bending branches themselves to reach the ground, and there to strike root, just as the gardener propagates shrubs by *layering*; whereas the roots themselves descend from a great height. When a sufficient number of these collateral trunks are formed to support the whole weight, the central, original stem may decay and disappear, as it often does, without affecting the existence of the tree; which thus increases into a grove, "high over-arched, with echoing walks between," that obviously may endure for

No one denies, however, that different species may have an *habitual* period of death; we only insist, that this is not a *necessary* period. In the course of things, a multitude of different accidents conspire to fix a mean limit to the life of man, which, though far below the natural period of death by old age, yet occurs with such regularity, under given conditions, that it is made a matter of calculation. So a particular kind of tree may be liable to certain accidents which habitually insure its destruction within a definite period. A tree of rapid growth generally has a soft and fragile wood, and is therefore especially subject to decay, or to be broken or overthrown by tempests; and the chances of its destruction are fearfully multiplied with the increasing spread and weight of the branches. Each species, too, being somewhat uniformly exposed to a particular class of accidents, according to its constitution and mode of growth, may consequently exhibit something like an average duration. But death can no more be said to ensue from old age, in such a case, than in that of the ordinary mortality of mankind. The whole tree does not necessarily suffer, like the animal, from the death or amputation of its limbs; those that remain may be thereby placed, perhaps, in a more favorable condition than before. A tree may certainly be conceived to survive all ordinary accidents, or to be protected against them, and thus to live indefinitely; while animals, even if shielded from all external injury, must at last succumb to internal causes of destruction, — unavoidable, because inseparable from their organization.

The Talipot-palm, which blossoms but once, and then perishes,— or the Century-plant, which continues in our conservatories even for a hundred years without flowering, but dies when it has ripened its fruit, — may be adduced as cases of death by old age. But in its native climes, where our so-called Century-plant blossoms in the fifth or sixth year of its age, it as uniformly dies immediately afterwards. The re-

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an indefinite period. Many such trees are known, of immense magnitude, and, doubtless, of most extraordinary age. But the vegetable physiologist well knows, that these essentially differ from ordinary trees, only in that a portion of the new wood, detached as it were from the branches, forms separate trunks, instead of adhering throughout to the main trunk, and contributing to its increase in circumference. These collateral trunks merely represent the outer and newer layers of ordinary trees, while the main stem represents the old and often decaying centre.

sult, in all such cases, is rather analogous to death from parturition, than to death by old age.

This doctrine of the indefinite longevity of trees — that they die from injury or disease, or, in one word, from accidents, but never really from old age — was first propounded by the distinguished De Candolle in one of his earliest writings*, near the commencement of the present century. It is entirely a modern doctrine, (unless, indeed, we may suppose, that Pliny comprehended the full meaning of his words, "*Vites sine fine crescunt*," which is improbable,) and it is by no means surprising, that it should have been received with incredulity, or vehemently controverted, by those who had not taken the pains to understand it. For the *a priori* considerations, from which the young Genevan botanist deduced his novel theory, were then, in truth, more or less hypothetical, and involved some hardy assumptions. They are now, however, amply confirmed, or, at least, so generally admitted by all vegetable physiologists, as to give the theory a high degree of antecedent probability. But De Candolle proceeded to indicate a mode in which its correctness might almost be tested by actual observation, and, having accumulated a great number of interesting *data*, he published, in 1831, the memoir which we have cited at the head of this article, and which, having been still further augmented, now constitutes one of the most interesting chapters of his masterly *Physiologie Végétale*.

If this view be well founded, it is to be expected, that different individuals of the same species should perish at very irregular periods; and that some should be found to escape all the ordinary accidents that trees are heir to, and thus attain a longevity far transcending the *habitual* duration of the species. Is this view sustained by observation?

Before adducing the evidence which bears upon this question, it is necessary to inquire how the actual age of a tree may be ascertained. In most cases, — in all those trees which increase in diameter by annual concentric layers, — that is to say, in nearly all trees except Palms and their allies, which for the present we may leave out of the question, the age may be directly ascertained by counting the annual rings on a cross section of the trunk. The record is sometimes illegible or nearly so, but it is perfectly authentic; and when fairly deciphered, we may rely upon its correctness.* But the venerable trunks, whose age we are most interested in determining, are rarely sound to the centre; and if they were, even the paramount interests of science would seldom excuse the *arboricide*. This decisive test, therefore, can seldom be practically employed, except in the case of comparatively young trees. The most remarkable recorded instance of its application is that of one of the old oaks at Bordza in Samogitia (Russian Poland); which, having been greatly injured by a conflagration, was felled in the year 1812, and seven hundred and ten concentric layers were distinctly counted on the transverse section, from the circumference towards the centre, where the space in which the layers could not be clearly made out was estimated to have comprised three hundred more. If the injured portion was not over-estimated, the tree must have been a thousand years old. We have now before us a section of a fine trunk of the American Cypress (*Taxodium distichum*), upon the radius of which, twenty-seven inches in length, six hundred and seventy annual layers may be distinctly counted. The wood of this tree is so durable, that probably the age of trunks of more than twice that size might be ascertained by direct inspection.

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* *Flore Française*, 1, p. 223.

When such a section cannot be obtained, we are obliged to resort to other and less direct evidence, affording only approximate, or more or less probable, conclusions. Sometimes lateral incisions, not endangering the life of the tree, furnish the means of inspecting and measuring a considerable number of the outer layers, and of computing the age of the trunk from its diameter and actual rate of growth. But, as young trees grow much more rapidly than old ones, we should greatly exaggerate the age of a large trunk, if we deduced its rate of growth from the outer layers alone. We must therefore ascertain, by repeated observations, the average thickness of the layers of young trees of the same species ; and by the judicious combination of both these *data*, a highly probable estimate may often be formed.

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* The discovery, or at least the first explicit announcement of the now familiar fact, that ordinary trees grow by annual layers, so that the record of their age is inscribed upon the section of the trunk, is generally attributed to Malpighi. But, probably, we should understand this celebrated anatomist as merely giving a formal statement of what was already popularly known; for so obvious a fact could scarcely have escaped notice. Prof. Adrien de Jussieu, the present representative of that illustrious family, has, moreover, lately reproduced a passage in the "*Voyage de Montaigne en Italie*," written in the year 1581, nearly fifty years before Malpighi was born, which proves this to have been the case. "*L'ouvrier, homme ingénieux et fameux à faire de beaux instruments de Mathématique, m'enseigna que tous les arbres portent autant de cercles qu'ils ont duré d'années, et me le fit voir dans tous ceux qu'il avoit dans sa boutique, travaillant en bois. Et la partie qui regarde le septentrion est plus étroite, et a les cercles plus serrés et plus denses que l'autre.*"

When unable to inspect any portion of the annual layers of remarkable old trees, we may occasionally obtain other indications upon which some reliance may be placed ; such as the amount of increase in circumference between stated intervals ; but as, on the one hand, we can never depend upon the entire accuracy of two measurements made at widely distant periods, while, on the other, the growth of a small number of years, however carefully ascertained, would be an unsafe criterion, this method can seldom be employed with much confidence. A more common mode is, to employ the average rate of growth of the oldest trees of which complete sections have been examined, for the approximate determination of the age of remarkably large trunks of the same species, where the size alone is known. For often repeated observation proves, that the increase is greatest, in other words, the layers are thickest, in young trees ; but that afterwards, —after the first century, for instance, — the tree increases in diameter at a much slower, but somewhat uniform, or else still decreasing, rate, which does not greatly vary in different trees of the same species. Such estimates would, therefore, always tend to underrate, rather than to exaggerate, the age of a large tree. But it is unsafe to apply this method to other than really venerable trunks ; for the growth of a tree is liable to great variations, during the first century or two ; either from year to year, or between different individuals of the same species. The injury of a single leading root or branch, or the influence of a stratum of sterile soil, may affect the whole growth of a young tree for a series of years ; while, in an older individual, the wide distribution of the roots and multiplication of the branches render the effect of local injuries nearly inappreciable, and the influence of any one or more unfavorable seasons is lost, in the average of a great number. Thus, the fine Elm in Cambridge, which, during the last winter, fell a victim to one of the most fatal and frequent accidents which, in this country, interfere with the longevity of trees,—having been cut down to make room for a petty building, just as it had reached its hundredth anniversary,—was fourteen feet in circumference, at the height of three or four feet from the ground.* The girth of its more renowned and fortunate neighbour, the "Washington Elm," is but little over thirteen feet; and it might accordingly be inferred that it is some years the junior of the "Palmer Elm." But we learn from a very authentic source, that the celebrated Whitfield, when excluded from the pulpits of the town and college, preached under the shade of this tree in the summer of 1744,—just a century ago. It is, doubtless, at least one hundred and twenty, or one hundred and thirty years old. We wish to place its size upon record, for the use of future generations; and we therefore take this opportunity to state, that the trunk of the "Washington Elm," at Cambridge, now measures thirteen feet and two and a half inches in circumference, at the height of three feet from the ground; this being the point at which the girth is smallest, being unaffected either by the expansion of the roots below, or of the branches above, and therefore the proper place to measure it for this purpose. That this size is conformable to the age assigned is apparent from a comparison with other trees; such, for instance, as the "Aspinwall Elm, in Brookline, standing near the ancient house belonging to the family of that name, and which was known to be one hundred and eighty-one years old in 1837, when it measured sixteen feet eight inches at five feet from the ground, and twenty-six feet five inches close by the surface."† The noted Elm upon Boston Common should be about the same age. Its present girth, at five feet from the ground, is sixteen feet and one inch; at the height of three feet, it measures seventeen feet eleven inches; near the earth, twenty-three feet and six inches. We have seen a map of Boston, published in the year 1720, upon which this Elm is delineated as a large tree. Its age, therefore, is certainly as great as that assigned to it in the subjoined account, which recently appeared in the newspapers of the day; — we know not upon what authority.*

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* This "Palmer Elm," as it was called, grew with more than ordinary rapidity for the first seventy years; when, to casual observation, it must have appeared nearly as large as when it was felled. For, during the last twenty-two years, it had increased only five and one half inches in diameter, that is, at the rate of a quarter of an inch *per annum*.

† We quote the manuscript of an esteemed friend, who has devoted much attention to the history and growth of trees, and whose long expected volume, on the trees of New England, we hope will soon be given to the public.

"The Boston Traveller states, that this noble tree was set out about the year 1670, by Captain Daniel Henchman, and is therefore one hundred and seventy-five years old. Captain Henchman was a schoolmaster in Boston, from 1666 to 1671. He joined the Ancient and Honorable Artillery Company in 1675. He was a distinguished captain, in King Philip's War, of a company of infantry. Forty-five years ago, the Great Elm had a large hollow in it, and was rapidly decaying, but was treated in the mode recommended by Forsyth, by clearing the cavity of rotten wood, and filling it with a composition composed principally of lime, rubbish from old buildings, and clay, and thus restored. It is now apparently as flourishing as ever, and without any appearance of the hollow, which was once large enough for a boy to hide himself in. The tree is a native Elm, which is the most hardy kind. Many of the old Elm-trees are what are called English Elms, with less extended roots and branches than the American."

But more commonly, perhaps, our estimates rest, either wholly or in part, upon historical evidence or tradition; and the most numerous and best authenticated cases of this kind may be expected to occur in Europe, where many trees, especially Chestnuts, Lindens, Oaks, and Yews, may be satisfactorily traced by records through several centuries.

Having thus briefly indicated the kinds or sources of evidence, which are brought to bear with more or less directness and force upon this interesting question, we proceed to offer a condensed account of some of the more remarkable or curious cases of longevity in trees; which may show to what extent, and with what results, this various testimony has been actually applied. The evidence is cumulative. Individual cases would be little worth, if unsupported by others. But mutually strengthening each other, the obvious conclusion becomes almost irresistible, even when the testimony in particular cases is very imperfect.

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* As such *data* may hereafter possess some interest, we may simply state, that the large "English Elm," one of the finest trees on Boston Common, is now eleven feet two inches in girth, at five feet from the ground; and twelve feet three inches, at the height of three feet. The American Elm, near the Botanic Garden at Cambridge, in front of the house of Judge Phillips, has a girth of thirteen feet, at six feet from the earth, and of fifteen feet, three feet lower down. Its neighbour, opposite the gardener's residence, is fourteen feet three inches in circumference, at six feet from the ground.

We leave entirely out of view the numerous allusions to old trees that may be gathered from classical writers. Nor are the more circumstantial accounts by Pausanias, Josephus, or the younger Pliny, available for our present purpose. The two latter, indeed, speak of trees as old as the creation ;* but they have unfortunately neglected to mention the evidence upon which their opinions were founded. Restricting ourselves, therefore, to trees which still survive, or which have existed within recent times, we commence our enumeration with one which is rather remarkable for its historical associations than for any extraordinary longevity ; namely, the celebrated Sycamore-Maple (*Acer Pseudo-Platanus*), which stands near the entrance of the village of Trons, in the Grisons, the cradle of liberty among the Rhœtian Alps. Under the once spreading branches of this now hollow and cloven trunk, the Gray League — so called, either from the gray beards, or the homespun clothing, of the peasants who there met the nobles favorable to their cause — was solemnly ratified in March, 1424. Upon the supposition, that it was only a century old, when the meeting, to which its celebrity is owing, took place, — and a younger tree would hardly have been selected for the purpose, — it has now attained the age of 520 years. It can scarcely be younger, it may be much older than this. In some of the earlier accounts, this tree is said to be a Linden. Indeed, it is so called in the inscription upon the walls of the adjacent little chapel. They were better patriots than botanists in those days ; for the investigations of Colonel Bontemps leave no doubt as to the identity of the tree.†

The Linden itself, however, is associated with some interesting points of Swiss history ; it also affords some instances of remarkable longevity, which the lightness and softness of its wood would by no means lead us to expect. The Linden in the town of Friburg, which was planted in 1476, to commemorate the bloody battle of Morât, though now beginning to decay, has already proved a more durable memorial than the famous ossuary on the battle-field,

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* Josephus relates, that he saw near Hebron a Terebinthus, which had existed ever since the creation (Lib. V., c. 31) ; and Pliny speaks of Oaks in the Hercynian forest, which he deems coeval with the world. *Hist. Nat.*, Lib. XVI., c. 2.

† *Bibliothèque Univ. de Genève*, Août, 1831.

> "Where Burgundy bequeathed his tombless host,
> A bony heap, through ages to remain
> Themselves their monument"; —

and may even outlast the obelisk recently erected upon its site. The age of this tree and the girth of its trunk being well known, — having attained the circumference of fourteen English feet in 364 years, — it has been employed as a standard of comparison, in computing the age of larger and more venerable trunks of the same species.

Such a tree is still standing at the village of Villars-en-Moing, near the town of Morât, in full health and vigor, although portions of the bark are known to have been stripped off about the time of the battle in 1476, when it was already a noted tree. At four feet above the ground, the trunk has a circumference of thirty-eight English feet, and, consequently, a diameter of about twelve feet. Supposing it to have grown, on the whole, even a little more rapidly than the Friburg Linden, which may be deemed a safe estimate, when we recollect that old trees grow much more slowly than younger ones, — supposing it to have increased in diameter at the average rate of one-sixth of an inch in a year, it must have been 864 years old at the time the measurement was made, in the year 1831. It is not probable, that this estimate materially exaggerates the age of the tree, even supposing the Linden at Friburg to have grown at less than the average rate for the species. It is nearly corroborated, indeed, by the more celebrated Linden of Neustadt on the Kocher, in Wurtemberg, whose age rests wholly upon historic evidence. The readers of Evelyn will surely remember his interesting account of this tree; and in recent times, some further particulars in its history have been rescued from oblivion by M. Jules Trembley, who visited it in 1831, at the instance of the illustrious De Candolle. It must have been already remarkable early in the thirteenth century; for, as is proved by documents still extant in the registers of the town, the village of Helmbundt, having been destroyed in the year 1226, was rebuilt three years afterwards, at some distance from its former site, in the vicinity of this tree, and took the name of *Neustadt an der grossen Linden.* An old poem, which bears the date of 1408, informs us, that " before the gate rises a Linden, whose branches are sustained by sixty-seven columns." The number of these columns, or pillars of stone, raised to support the heavy and widely spreading branches, one of which extends horizontally for more than a hundred feet, had increased to eighty-two when the tree was visited by Evelyn, and to one hundred and six when it was examined by Trembley. To these supports, doubtless, its preservation is chiefly owing; as the tender wood of the Linden could never sustain the enormous weight of the limbs, or resist the force of the winds. These pillars are nearly covered with inscriptions; of which the most ancient that was extant in Evelyn's time bore the date of 1551 ; but the oldest now legible bears the arms of Christopher, Duke of Wurtemberg, with the date of 1558. At five or six feet from the ground, the trunk is thirty-five and a half English feet in circumference. If, therefore, it has grown at the actual rate of the Friburg Linden, it must nearly have reached its thousandth anniversary. Or if, as in the case of the tree near Morât, we allow a sixth of an inch *per annum* for the average increase in diameter, its computed age would be a little over 800 years ; surely, a moderate estimate for a tree which was called the Great Linden more than six centuries ago.

No tree of temperate climates so frequently attains an extraordinary size as the Plane, or Sycamore (*Platanus*) ; trunks of forty or fifty feet in circumference being by no means uncommon in this country. The Oriental Plane offers many equally striking instances in the South of Europe, particularly in the Levant. The celebrated tree on the island of Cos, so conspicuously seen from the channel on the Asiatic side, has recently been beautifully figured in Allan's " Pictorial Tour in the Mediterranean."

But old trunks, both of the Oriental, and our own very similar species, are always hollow,— mere shells ; hence, in the absence of historical *data*, their age is only to be computed by their rate of growth ; which is so rapid for the first century or two, and, at the same time, the wood is so liable to decay, that the Plane-tree is not likely to afford any instances of extreme longevity. A different conclusion might, indeed, be drawn from the accounts of an enormous Plane in the valley of Bouyoudereh, near Constantinople, described by Olivier, Dr. Walsh, and others; the trunk of which is one hundred and fifty feet in girth, with a central hollow of eighty feet in circumference. But the recent observations of an excellent scientific observer, Mr. Webb, leave no doubt, that this monster-trunk is formed by the junction of several original trees, planted in close proximity.* Along the shores of the Bosphorus, there are many groups of younger Planes, which, for their shade, have been designedly planted in a narrow circle, and their trunks will in time become similarly incorporated. Pliny's Lycian Plane, with a cavity of eighty-one feet in circumference, in which the consul Licinius Mutianus used to lodge with a suite of eighteen persons, may have had such an origin.

We next notice the Chestnut, for the purpose of disposing of an analogous case of pseudo-longevity; that of the famous *Castagno di cento cavalli;* so named from the somewhat apocryphal tradition, that Jeanne of Arragon, and a hundred cavaliers of her suite, took refuge under its branches during a heavy shower, and were completely sheltered from the rain. According to Brydone, who visited it in the year 1770, the trunk, or rather trunks, — for it then had the appearance of five distinct trees, — measured two hundred and four feet in circumference; but later and more trustworthy observers reduce these dimensions to one hundred and eighty or one hundred and ninety feet. A hut has been erected in the hollow space, with an oven, in which the inhabitants dry the chestnuts and other fruits which they wish to preserve for winter, using at times, for fuel, pieces cut with a hatchet from the interior of the tree. The separation of a large hollow trunk into independent portions, appearing like the remains of as many distinct trees, is not in itself improbable. The ancient Yew in Fortingal churchyard, Scotland, presents a striking instance of the kind. Indeed, Brydone's guides assured him,

"that, by the universal tradition and even testimony of the country, all these were once united in one stem; that their grand-fathers remembered this, when it was looked upon as the glory of the forest, and visited from all quarters; though, for many years past, it had been reduced to the ruin we beheld. We began to examine it with more attention, and found that there is an appearance, that these five trees were once really united in one. The opening in the middle is at present prodigious, and it does indeed require faith to believe, that so vast a space was once occupied by solid timber. But there is no appearance of bark on the inside of any of the stumps, nor on the sides that are opposite to one another. . . . . . I have since been told by the Canon Ricupero, an ingenious ecclesiastic of this place, that he was at the expense of carrying up peasants with tools to dig round the *Castagno di cento cavalli;* and he assures me, upon his honor, that he found all these stems united below ground into one root." *

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* Moquin-Tandon, *Teratologie Vég.* p. 290.— By the way, although De Candolle was not at the time apprized of the real nature of this Plane, yet he was far too cautious a reasoner to estimate its age at 2,000 years, as Mr. Nuttall has inadvertently stated (*Sylva*, I., p. 50). Whoever will read the whole paragraph in the *Physiologie Végétale*, II., p. 994, will perceive that it will by no means bear that construction.

It appears, however, that Brydone has not fairly represented the worthy Canon Ricupero's opinion : for he thought it probable, that these present trunks were offshoots from the persistent base of a more ancient stem ; a conclusion which is fully sustained by the observations of several competent naturalists, such as Duby,† Brunner,‡ and Philippi.§ Every one knows how readily the Chestnut will throw up shoots from the root; and Philippi says it is a general custom in Sicily to cut them down after they have attained a considerable size, when the new stems that are thrown out from the base shortly become trees again. Other considerations would prevent our assigning the highest antiquity to a tree not originally indigenous to Sicily, but doubtless introduced from the East.

There are, however, some colossal Chestnuts upon Mount Etna, with undoubtedly single trunks ; three of which, recently measured, are found to have a circumference respectively of fifty-seven, sixty-four, and seventy feet. Some general idea of their age may perhaps be formed by a comparison with other individuals, whose history is better known ; such as that at Sancerre, described by Bosc, which, although only thirty-three feet in girth at six feet from the ground, has been called the "Great Chestnut of Sancerre" for six hundred years ; or the celebrated " Tortworth Chestnut," which Strutt, who, in his *Sylva Britannica*, has given a fine illustration of its massive bole, considers as probably the largest, as well as the oldest tree, standing in England, and which, in the reign of Stephen, who ascended the throne in 1135, was already remarkable for its size, and well known as a signal boundary to the manor of Tamworth, now Tortworth, in Gloucestershire. But even this tree, although it has probably long since celebrated its thousandth anniversary, does not equal the smallest of the three Sicilian Chestnuts, being only fifty-two feet in circumference at five feet from the ground.

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* *Tour through Sicily and Malta.*

† De Candolle, *Phys. Vég.*, II., p. 992.

‡ *Excursion through the East of Liguria, Sicily, and Malta.*

§ *Über die Vegetation am Ætna; in Linnæa*, VII., p. 727 ; and in *Comp. to Bot. Mag.*, I., p. 90.

In the ascending scale of longevity, we pass from the Chestnut to the Oak, the emblem of embodied strength, one of the longest-lived, as it is the slowest-growing, of deciduous-leaved forest trees. The light and soft wood of the Linden, and even of the Chestnut, seems incompatible with great longevity. Such trees of eight hundred or a thousand years old are extraordinary phenomena, owing their prolonged existence to a rare conjunction of favorable circumstances, — the more important, as they are unexpected witnesses to the truth of our leading proposition. But this is no very uncommon age for that

> " Lord of the woods, the long-surviving Oak."

The briefest biographical notice of Oaks remarkable for their age or size, or for historic memorials attesting their antiquity, would alone fill our pages. We can only refer the curious reader to the pages of Evelyn, of Gilpin, and of Strutt ; to the learned, but over-labored, *Amœnitates Quercineæ* of the late Professor Burnet, in Burgess's *Eidodendron*, and especially to the more accessible and standard *Arboretum* of Loudon, whose condensed statistical account of celebrated British Oaks, occupying thirty closely printed pages of that elaborate work, is a monument of diligence, and contains a vast amount of interesting information. Indeed, Mr. Loudon's whole account of the Oak is incomparable, and should alone suffice to immortalize his name. Among the oldest specimens now extant in England are to be enumerated, the " Parliament Oak," in Clipstone park, supposed to be the oldest park in England, which derives its name from a Parliament having been held under it by Edward the First, in 1290 ; the Oak in Yardley Chase, which

Cowper has immortalized; the "Winfarthing Oak," now a bleached ruin, which is said to have been called an old Oak at the time of the Conquest; the Oak in Melbury park, Dorsetshire, which Mitchell calls "as curly, surly, knotty an old monster as can be conceived"; the "Greendale Oak," in the Duke of Portland's park at Welbeck, well known from Evelyn's account, and from the series of figures which his editor, Hunter, has given of its mutilated trunk, pierced by a lofty arch through which carriages have been driven; the "Cowthorpe Oak," in Yorkshire, also figured by Hunter, the trunk of which measures seventy eight feet in circumference near the ground, and the age is estimated as nearly coeval with the Christian era; and the "Great Oak of Salcey Forest," in Northamptonshire, "a most picturesque sylvan ruin," which is perhaps of equal antiquity.

We have already mentioned the tree at Bordza, felled some thirty years ago, which was proved, by inspection of its annual layers, to have been about a thousand years old. Its trunk was forty English feet in circumference, or twelve and a half feet in diameter. This was a goodly tree for an Oak; but it shrinks almost to insignificance when compared with one in the South of France; an account of which has quite recently been published. From a late number of the "Gardeners' Chronicle," edited by Professor Lindley, we copy the following account, which purports to have been extracted from the Annals of the Agricultural Society of Rochelle.

> "At about six miles west-southwest of Saintes (in the Lower Charente) near the road to Cozes, stands an old Oak-tree, in the large court of a modern mansion, which still promises to live many centuries, if the axe of some Vandal does not cut it down. The following are the proportions of this king of the forests of France, and probably of all Europe. The diameter of the trunk at the ground is from nine to ten yards [consequently, its circumference is from eighty-five to ninety-four feet]; at the height of a man, from six and a half to seven and a half yards [from sixty to sixty-seven feet in circumference]; the diameter of the whole head, from forty to forty-three yards; the height of the trunk, eight yards; the general height of the tree, twenty-two yards. A room has been cut out of the dead wood of the interior of the trunk, measuring from nine to twelve feet in diameter, and nine feet high; and they have cut a circular seat out of the solid wood. They put a round table in the middle, when it is wanted, around which twelve guests can sit. A door and a

window admit daylight into this new sort of dining-room, which is adorned by a living carpet of Ferns, Fungi, Lichens, &c. Upon a plate of wood taken from the trunk about the height of the door, two hundred annual rings have been counted, whence it results, in taking a horizontal radius from the exterior circumference to the centre of the oak, that there must have been from 1,800 to 2,000 of these rings; which makes its age nearly two thousand years."

We should have been told, however, from what portion of the radius this block was taken. If near the circumference, where the rings are narrowest, the age of the tree has been over-estimated; perhaps not materially so, as it must have been growing at a slow and nearly equable rate for many centuries; if towards the centre, the computed age is within the truth. To this tree, therefore, as being probably the patriarch of the species in Europe, may well be applied the lines addressed by Cowper to the Yardley Oak:

> "O, couldst thou speak,
> As in Dodona once thy kindred trees,
> Oracular, I would not curious ask
> The future, best unknown; but, at thy mouth,
> Inquisitive, the less ambiguous past!
> By thee I might correct, erroneous oft,
> The clock of history; facts and events
> Timing more punctual; unrecorded facts
> Recovering; and misstated, setting right."

Rich although this country is, above all other parts of the world, in different species of the Oak, it would not be difficult to explain why we cannot boast of such venerable trees,

> "Whose boughs are mossed with age,
> And high top bald with dry antiquity."

It is not merely, or chiefly, that, in clearing away the forest which so recently covered the soil, "men were famous according as they had lifted up axes upon the thick trees." The close, stifling growth of our primeval forests, like the democratic institutions which they seem to foreshadow, although favorable to mediocrity, forbids preëminence. "A chilly, cheerless, everlasting shade" prevents the fullest individual development; and even if the woodman's axe had spared the older trees, their high-drawn trunks, no longer shielded by the dense array of their brethren, were sure to be overthrown by the winds. Had the aboriginal inhabitants been tillers of the ground, our White Oaks had long since spread their broad brawny arms, and emulated their more renowned brethren in the parks of England. The "Charter Oak" at Hartford, so conspicuous in the colonial history of Connecticut, and a few others of equal size, but less note, were probably mere saplings at the first settlement of the country. "The Wadsworth Oak" in Geneseo, N. Y., however, may claim a higher antiquity. It stands in an old "Indian clearing," on the bank of the Genesee River, which, we are sorry to say, is gradually undermining its roots and threatening its destruction; — a catastrophe which we beseech the worthy proprietor of that princely estate to avert, by a seasonable embankment. A note in an earlier volume of this Review* assigns to this noble tree the age of at least five hundred years; — a credible estimate, notwithstanding the girth of the tree is somewhat overstated in that account. Its circumference at the smallest part of the trunk, (four feet above the ground,) — which is always the proper point for measurement, — instead of from twenty-four to twenty-seven, is only twenty-two feet four inches; although near the base, owing to the influence of the spreading roots, its girth is considerably greater.

But of all American species, the invaluable Live Oak of our southern coasts will probably be found to attain the greatest longevity; although it seldom becomes a very large, or, at any rate, a very tall tree. Like the finest European Oaks, its branches spread very widely, and contain a prodigious quantity of timber. "The trunk of the Live Oak," says Mr. Bartram, in his delightful "Travels in Florida," "is generally [on the St. John's River] from twelve to eighteen feet in girth, and rises ten or twelve feet erect from the earth; some I have seen eighteen or twenty; then divides itself into three, four, or five great limbs, which continue to grow in nearly a horizontal direction, each limb forming a gentle curve, or arch, from its base to its extremity. I have stepped above fifty paces, on a straight line, from the trunk of one of these trees to the extremity of the limbs."

The younger Michaux mentions a tree felled near Charleston, whose trunk was twenty-four feet in circumference; and we learn that another individual of still greater size is still flourishing on the plantation of Mr. Middleton, near that city. According to Mr. Nuttall,* the tree sometimes acquires the diameter of eight or nine feet in West Florida. All these trees must have attained a great age ; for this heavy and almost incorruptible wood is of extremely slow growth. May we not hope, that some competent observer will collect the requisite information upon this subject, before all the larger trunks have yielded to their impending fate ?

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* Vol. XLIV., p. 345, note.

The Olive grows much more slowly than the Oak ; and as its wood is very compact and durable, it is not surprising that it should furnish instances of extraordinary longevity. In comparative youth, the stem increases in diameter only at the rate of an eighth of an inch in a year. Therefore the Olive at Pescio, mentioned by De Candolle, having a trunk of twenty-four feet in girth, should be seven hundred years old ; even supposing it to have grown, throughout, at the ordinary rate for younger trees ; while the still larger tree at Beaulieu, near Nice, described by Risso, and recently measured by Berthelot, doubtless the oldest of the race in Europe, should be more than a thousand years old. Although now in a state of decrepitude, it still bears an abundant crop of fruit, or at least did so, as late as the year 1828.† It is not improbable, therefore, that those eight venerable trees, which yet survive upon the Mount of Olives, may have been in existence, as tradition asserts, at the time of our Saviour's passion.

Let us now direct our attention to the class of Coniferous trees ; among which, on account of the resinous matters that commonly pervade their wood and tend to preserve it from decay, as well as for other reasons which we will not stop to explain, instances of longevity may be expected to occur not inferior to those already noticed.

We begin with the classical Cypress (*Cupressus sempervirens*), so celebrated in all antiquity for the incorruptibility of its wood and its funereal uses ; doubtless, one of the longest-lived trees of Southern Europe and of the East. Hunter, in his edition of Evelyn, about a century ago, mentions the fine avenue of Cypresses, ***Los Cupressos de la Reyna Sultana***, which adorns the garden of the Generaliffe at

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* *N. Am. Sylva,* Supplement, I., p. 16.

† Risso, *Hist. Nat. Europ. Merid.* ex Moquin-Tand., *Teratol. Vég.*, p. 105.

Granada. Under their shade, according to the well known legend, the last Moorish king of Granada surprised his wife with one of the Abencerrages ; which led to the massacre of thirty-six princes of that race. This was, of course, before the year 1492, the date of the final expulsion of the Moors. These enduring memorials of frailty and revenge were still flourishing in perennial vigor in 1831, when they were examined by Mr. Webb. Supposing them to have been only forty or fifty years old at the occurrence of the event to which they owe their celebrity, — surely a reasonable supposition, as they were then large trees, according to the legend, — they have now reached the age of about four hundred years. They are probably much older than this.

But these, and all other Cypresses known in Europe, are striplings in comparison with the tree at Somma, in Lombardy ; which Loudon has figured in his *Arboretum* (p. 2470), from an original drawing furnished by Signor Manetti of Monza. The tree is greatly reverenced by the inhabitants of that part of Lombardy, who have a tradition, that it was planted in the year of our Saviour's birth. Even Napoleon is said to have treated it with some deference, and to have deviated from a direct line to avoid injuring it, when laying down the plan for the great road over the Simplon. Its trunk was twenty feet in girth, according to the Abbé Belèze's measurement, in 1832; or twenty-three feet at the height of a foot from the ground, as Signor Manetti states. Since the Cypress only attains the circumference of fourteen or fifteen feet in four hundred years or more, and after that must increase with extreme slowness, we may, perhaps, place some credit in the popular tradition respecting the age of this tree, or in the testimony of the Abbé Belèze, who informed Mr. Loudon, that his brother assured him, that there is an ancient chronicle extant at Milan, which proves this tree to have been in existence in the time of Julius Cæsar !

To the same class, also, belongs the goodly Cedar of Lebanon (*Cedrus Libani*), from which the sacred writers have derived so many forcible and noble images. It is generally employed as an emblem of perennial vigor and longevity. The most plausible derivation of the name is from the Arabic *kedroum* or *kèdre*, signifying *power* ; and the most characteristic description of the tree, with its wide-spread horizontal branches and close-woven leafy canopy, is that given by the prophet Ezekiel, where it is assumed as a type of the grandeur and strength of the Assyrian empire.

> "Behold, the Assyrian was a Cedar in Lebanon, with fair branches, and with a shadowing shroud, and of an high stature; and his top was among the thick boughs. . . . . . Thus was he fair in his greatness, in the length of his branches; for his root was by great waters. The Cedars in the garden of God could not hide him; the Fir-trees were not like his boughs, and the Chestnut-trees were not like his branches; nor any tree in the garden of God like unto him in beauty."—*Ezekiel*, xxxi. 3, 7, 8.

The celebrated grove near the summit of Mount Lebanon, to which there are particular allusions in Holy Writ, was first described in modern times by Belon, who visited it about the year 1550. The majestic old Cedars of this grove — at that time the sole, as they are still the finest, known representatives of the species — were then, as now, venerated by the Maronite Christians; who firmly believed them to have been coeval with Solomon, if not planted by his own hands; and made an annual pilgrimage to the spot, at the festival of the Transfiguration; the Patriarch celebrating high mass under one of the oldest Cedars, and very properly anathematizing all who should presume to injure them. The larger trees were described and measured by Rauwolf, an early German traveller, in 1574; by Thevenot, in 1655; and more particularly by Maundrell, in 1696; by La Roque, in 1722; by Dr. Pococke, in 1744; and by Labillardière, in 1787; since which time, De Candolle states, that all the older trees have been destroyed. But we have not been able to find the authority for this statement, and have reason to doubt its correctness. Although the number of large trees has diminished in every succeeding age, yet several recent visiters mention a few large trunks of equal size with those described by the earlier travellers. Indeed, M. Laure, an officer of the French Marine, who, with the Prince de Joinville, visited Mount Lebanon in the autumn of 1836, says, that all but one of the sixteen old Cedars mentioned by Maundrell are still alive, although in a decaying state; and that one of the healthiest, but perhaps the smallest trunks, measured thirty-three French feet, or about thirty-six English feet, in circumference, which, by the way, is nearly the girth of the largest that Maundrell measured. We have little faith, however, in this particular identification; nor do we place confidence in the rate of growth of old Cedars, as deduced from the measurement of these trees at different periods. For, could we be sure that any two of these measurements were actually taken from the same trunk, it is still very unlikely that they were made at the same height from the ground; — a matter of great consequence, but which is left out of view in the records of the early travellers. But the girth of the larger trees being known by various measurements, and the average rate of growth of young Cedars being approximately determined from individuals that have grown in Europe, of well ascertained age and size, — such, for instance, as those in the Chelsea Botanic Garden, near London, planted in 1683, and the fine tree which adorns the hill in the *Jardin des Plantes* at Paris, and which was brought from England in 1734 by Bernard de Jussieu, — carried, it is said, in the crown of his hat, for greater security, whose trunk, at its centennial anniversary, had just attained the circumference of ten feet, — we only need to know the thickness of the outer layers of these remarkable old trunks, or, in other words, their actual and recent rate of increase, in order to form a highly probable estimate of their age. By a few careful incisions into these trunks, the next traveller into the now frequented East, who feels interested in such questions, might supply this remaining *desideratum*, without real injury to these renowned natural monuments, or just exposure to the Patriarch's anathema.

From such very imperfect *data* as we now possess, De Candolle deems the trees measured by Rauwolf to have been at least six hundred years old; which would give the age of nearly nine hundred years to any of the number that may still survive. This estimate may fall considerably below the truth; but our present knowledge will not warrant the assumption of a higher one. Doubtless, this remarkable forest has existed from primeval times, while the oldest individuals, from age to age, have decayed and disappeared. But venerable as are the present representatives, which La Martine so grandiloquently apostrophizes, and conceives to have existed in the days of Solomon, "yet few comparatively have the days of the years of their life been, and have not attained unto the days of the years of the life of their fathers," the real patriarchs of this world-renowned grove.

The Yew has, probably, a well founded claim to its reputation, as the longest-lived tree of Northern Europe ; and its longevity appears the less surprising, when the closeness and incorruptibility of the wood are considered, as well as its extreme slowness of growth. A Yew

> "Of vast circumference and gloom profound"

is truly, as Wordsworth has it,

> "a living thing,
> Produced too slowly ever to decay ;
> Of form and aspect too magnificent
> To be destroyed."

The frequent occurrence of ancient Yews in English church-yards is simply and beautifully explained by Mr. Bowman ; * — the Yew, being indisputably indigenous to Great Britain, and being, from its perennial verdure, its longevity, and the durability of its wood, at once an emblem and an example of immortality, its branches would be employed by our Pagan ancestors, on their first arrival, as the best substitute for the Cypress, to deck the graves of the dead, and for other sacred purposes ; and the innocent custom, like others of heathen origin, would naturally be retained and engrafted upon Christianity, at its first introduction.

From the inspection of various trunks of two or three hundred years old, De Candolle drew the conclusion, that the trunk of the Yew increases in diameter at the rate of a little more than a line — the twelfth of an inch — in a year, for the first 150 years, and at a little less than this rate, during the next century or two. De Candolle proposed, therefore, to estimate the age of ancient Yews by assuming a line *per annum*, as their average growth in diameter. Their age would in this way be readily computed by measuring their circumference, and thence obtaining the radius in lines ; the tree being reckoned as many years old as there are lines in its diameter. Since all trees grow the more slowly as they advance in years, this method would seem to be a safe one, if we were well assured that the average rate of growth has been correctly assumed. But extended observation upon Yews in England has shown, that young trees often grow much more rapidly than De Candolle supposed ; so that, from the application of his rule to Yews not more than four or five hundred years old, we should be liable greatly to exaggerate their age. But it is also found, that still older trees grow so much more slowly, that the rule may be applied to very ancient Yews with reasonable probability that the estimate will fall beneath the truth, and make them appear younger than they really are. The greater the circumference of the tree, the less the danger that its more rapid early growth will falsify the estimate. The adoption of this rule leads, however, to rather startling conclusions.

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* In *Mag. Nat. Hist.*, 2d Ser., I., p. 86.

The computed age of the famous Yews of Fountains' Abbey, near Ripon, in Yorkshire, is to a great extent sustained by the history of the abbey itself, as chronicled by Hugh, a monk of Kirkstall, whose narrative — still preserved, it is said, in the library of the Royal Society — forms the basis of the well known account in Burton's *Monasticon*. This monastery, the noble ruins of which are now overlooked by the venerable trees that watched its erection, was founded in the year 1132, by Thurstan, Archbishop of York, for certain monks, whose consciences, being too tender to allow them to indulge in the relaxed habits of their own order, made them desirous of adopting the more rigid rule of the Cistercians, then recently introduced into England.

> "At Christmas," therefore, says Burton, "the Archbishop, being at Ripon, assigned to these monks some land in the patrimony of St. Peter, about three miles west of that place, for the erecting of a monastery. The spot of ground had never been inhabited, unless by wild beasts, being overgrown with wood and brambles, lying between two steep hills and rocks, covered with wood on all sides, more proper for a retreat for wild beasts than for the human species. . . . . . Richard, the Prior of St. Mary's at York, was chosen Abbot by the monks, being the first of this Monastery of Fountains; with whom they withdrew into this uncouth desert, without any house to shelter them in that winter season, or provisions to subsist on, but entirely depending on Divine Providence. There stood a large Elm in the midst of the vale, on which they put some thatch or straw, and under that they lay, ate, and prayed; the Bishop for a time supplying them with bread, and the rivulet with drink. But it is supposed, that they soon changed the shelter of their Elm for that of seven Yew-trees growing on the declivity of the hill on the south side of the abbey; all standing at this present time [1658], except

the largest, which was blown down about the middle of the last century. They are of an extraordinary size; the trunk of one of them is twenty-six feet six inches in circumference, at the height of three feet from the ground; and they stand so near each other as to form a cover almost equal to a thatched roof. Under these trees, we are told by tradition, the monks resided till they built the monastery; which seems to be very probable, if we consider how little a Yew-tree increases in a year, and to what a bulk these are grown." — BURTON, *Monast.*, fol. 141.

We have Pennant's measurement of one of these trees, taken in 1770, giving it a diameter of eight feet five inches, or 1,212 lines. Hence, according to De Candolle's rule, it was then 1,200 years old.

The fine Yew at Dryburgh Abbey, which is supposed to have been planted when the abbey was founded, in 1136, and which is in full health and vigor, has a trunk only twelve feet in circumference; its estimated age would, therefore, be less than 600 years.

The "Ankernyke Yew," near Staines, a witness of the conference between the English Barons and King John, and in sight of which Magna Charta was signed (between Runnymede and Ankernyke house), and beneath whose shade the brutal Henry the Eighth first saw gospel light in Anna Boleyn's eyes, measures twenty-seven feet eight inches in circumference, and should therefore be 1,100 years old, which is about the age that tradition assigns to it. The trunk of the "Darley Yew" in Derbyshire, having a mean diameter of nine feet five inches, would, by this rule, be 1,356 years old. The Yew in Tisbury church-yard, Dorsetshire, the trunk of which measures thirty-seven feet in circumference, would now be almost 1,600 years old. The same computation, applied to the "superannuated Yew-tree of Braburne church-yard, Kent," which, by the measurements of Evelyn himself, and of Sir George Carteret, was fifty-eight feet eleven inches in circumference, in the year 1660, would give it the respectable age of 2,540 years at that time! This tree has long ago disappeared. But it did not greatly exceed in size the Yew still extant in Fortingal church-yard, in Perthshire, Scotland, situated in a wild district among the Grampian Mountains, which forms a good collateral witness to the credibility of Evelyn's account. The trunk of the "Fortingal Yew" was fifty-two feet in circumference, when measured by the Hon. Daines Barrington in 1769;[*] or fifty-six feet six inches, according to Pennant's somewhat later measurement;[†] the discrepancy being, no doubt, attributable to the fact, that the two measurements were taken at different heights. In Barrington's time, the surface was nearly entire at the base, although upon one side all the interior had decayed. Afterwards, the cavity reached the opposite surface; and the trunk at length separated into two distinct semicircular portions, dead and decaying within, but alive and growing at the circumference, between which the rustic funeral processions were long accustomed to pass, on their way to the grave. In this condition, it is figured by Strutt, as the first illustration of his *Sylva Scotica*; but he has omitted to inform us when the sketch was taken. We suspect, that it represents the tree as it appeared more than fifty years ago; for, if we rightly apprehend the account given by the excellent Dr. Neill of Edinburgh, who visited the place in the summer of 1833, one of these half-trunks has now disappeared, with the exception of some decayed portions that scarcely rise above the soil; but the other, which still shoots forth branches from the summit, "gives a diameter of more than fifteen feet; so that it is easy to conceive, that the circumference of the bole, when entire, should have exceeded fifty feet." "Considerable spoliations," Dr. Neill further observes, "have evidently been committed on the tree since 1769; large arms have been removed, and masses of the trunk itself carried off by the country people, with the view of forming *quechs*, or drinking-cups, and other relics, which visiters were in the habit of purchasing. Happily, further depredations have been prevented by means of an iron rail, which now surrounds the sacred spot; and this venerable Yew, which, in all probability, was a flourishing tree at the commencement of the Christian era, may yet survive for centuries to come."[‡]

But we must not forget the typical representatives of the class of Coniferous trees, the stately Pines and Firs; several species of which attain a great size, and especially an unexampled height. Indeed, their mode of growth — their straight, regularly tapering trunks, carried steadily upwards by the continued prolongation of the leading shoot, as well as the small lateral extension of their branches—is extremely favorable to loftiness of stature, and to full development in the midst of the forest. In such trees our own country abounds. We need not dwell upon so familiar an object as our own White Pine, which, like Saul, "from his shoulders upwards, higher than any of the people," lifts its kingly form above its forest-brethren, to the altitude of from one hundred and fifty to at least one hundred and eighty feet.

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[*] *Phil. Trans.*, LIX., p. 37.

[†] *Tours in Scotland*, in Pinkerton's *Gen. Coll.*, Vol. III.

[‡] Jameson's *Edinb. Phil. Jour.* (1833), XV. p, .343.

> "Not a prince,
> In all that proud old world beyond the deep,
> E'er wore his crown as loftily, as he
> Wears his green coronal of leaves."

The White Pine is, *par excellence*, a New England tree, and has ever been identified with our commercial prosperity. The colonists of Massachusetts Bay, at a very early period, selected it as their cognizance, and when they first assumed the rights of a free people, they stamped its image on their coins. It does not seem to flourish on foreign soil; as we infer from Loudon's description, and the ill-favored figure which he gives as an illustration of its general appearance in English parks and pleasure-grounds;* no less than from Gilpin's complaint of its "*meagreness* in foliage."†

Yet even the White Pine is overtopped by the Douglas Spruce (*Pinus Douglasi*), which forms the principal part of the gloomy forests of Oregon. The extraordinary height which this species attains was first recorded by Lewis and Clarke; who state, that the trunk is very commonly twenty-seven, and often thirty-six feet, in circumference, at six feet above the earth's surface; and rises to the height of two hundred and thirty feet,—one hundred and twenty of that height without a limb. One which was measured by a member of their party is said to have been forty-two feet in girth, at a height beyond the reach of an ordinary man, and was estimated to reach the altitude of three hundred feet!‡

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* *Arb. Brit.*, IV., p. 2881, f. 2196.

† *Forest Scenery*, I., p. 87.—The natural and economical history of this important tree has already been fully recorded on the pages of this Journal. Vol. XLIV., p. 339, and Vol. LVIII., p. 300.

‡ *History of the Expedition of Lewis and Clarke*, II., p. 155.—More surprising still, and, as to the height compared with the diameter of the trunk, to us nearly incredible, is their account of a fallen tree of the same species on Wappatoo Island, which, they state, "measured 318 feet in length, although its diameter was only three feet!"—*Op. cit.*, II., p. 225.

This account, so far as respects the general height of the tree, has been amply confirmed by succeeding travellers, and especially by that enterprising botanist, the late Mr. Douglas, whose name the species bears, and to whom its discovery is generally attributed.* Mr. Douglas was really the first to make known the Lambert Pine (*Pinus Lambertiana*) to the scientific world; a species which grows on the southern frontiers of the Oregon Territory and in Northern California: the height of which is the more extraordinary, as the trees do not form a thick forest, but are rather sparsely scattered over the plains. To give our readers some idea of the hardships which this indefatigable collector endured, and the risks at which our nurseries have been stocked with the trees, and our gardens with the now familiar flowers of Oregon and California, we extract from the Journal of Douglas a portion of the account of his visit to a group of these Lambert Pines; merely remarking, that it seems to afford a fair specimen of the perils which he continually incurred. Poor fellow! to have the life at last stamped out of him by a mad bullock in a pit, while pursuing his researches upon one of the Sandwich Islands!

"*Thursday, the 25th.* Weather dull, cold, and cloudy. When my friends in England are made acquainted with my travels, I fear they will think that I have told them nothing but my miseries. This may be very true; but I now know, as they may do also, if they choose to come here on such an expedition, that the objects of which I am in quest cannot be obtained without labor, anxiety of mind, and no small risk of personal safety, of which latter statement my this day's adventures are an instance. I quitted my camp early in the morning, to survey the neighbouring country, leaving my guide to take charge of the horses until my return in the evening, when I found that he had done as I wished, and in the interval dried some wet paper which I had desired him to put in order. About an hour's walk from my camp, I met an Indian, who, on perceiving me, instantly strung his bow, placed on his left arm a sleeve of raccoon skin, and stood on the defensive. Being quite satisfied that this conduct was prompted by fear, and not by hostile intentions, the poor fellow having probably never seen such a being as myself before, I laid my gun at my feet, on the ground, and waved my hand for him to come to me, which he did, slowly and with great caution. I then made him place his bow and quiver of arrows beside my gun, and, striking a light, gave him a smoke out of my own pipe, and a present of a few beads. With my pencil I made a rough sketch of the *Cone* and *Pine-tree* which I wanted to obtain, and drew his attention to it, when he instantly pointed with his hand to the hills fifteen or twenty miles distant towards the south; and when I expressed my intention of going thither, he cheerfully set about accompanying me. At mid-day I reached my long-wished-for Pines, and lost no time in examining them, and endeavouring to collect specimens and seeds. New and strange things seldom fail to make strong impressions, and are therefore frequently overrated; so that, lest I should never again see my friends in England to inform them verbally of this most beautiful and immensely grand tree, I shall here state the dimensions of the largest I could find among several that had been blown down by the wind. At three feet from the ground, its circumference is fifty-seven feet nine inches; at one hundred and thirty-four feet, seventeen feet five inches; the extreme length two hundred and forty-five feet.* The trunks are uncommonly straight, and the bark remarkably smooth, for such large timber, of a whitish or light-brown color, and yielding a great quantity of bright amber gum. The tallest stems are generally unbranched for two thirds of the height of the tree; the branches rather pendulous, with cones hanging from their points, like sugar-loaves in a grocer's shop. These cones are, however, only seen on the loftiest trees, and the putting myself in possession of three of these (all I could obtain) nearly brought my life to a close. As it was impossible either to climb the tree or hew it down, I endeavoured to knock off the cones by firing at them with ball, when the report of my gun brought eight Indians, all of them painted with red earth, armed with bows, arrows, bone-tipped spears, and flint knives. They appeared anything but friendly. I endeavoured to explain to them what I wanted, and they seemed satisfied, and sat down to smoke; but presently I perceived one of them string his bow, and another sharpen his flint-knife with a pair of wooden pincers, and suspend it on the wrist of the right hand. Further testimony of their intentions was unnecessary. To save myself by flight was impossible; so, without hesitation, I stepped back about five paces, cocked my gun, drew one of the pistols out of my belt, and holding it in my left hand and the gun in my right, showed myself determined to fight for my life. As much as possible I endeavoured to preserve my coolness, and thus we stood looking at one another without making any movement or uttering a word for perhaps ten minutes, when one, at last, who seemed the leader, gave a sign that they wished for some tobacco: this I signified that they should have, if they fetched me a quantity of cones. They went off immediately in search of them, and no sooner were they all out of sight, than I picked up my three cones and some twigs of the trees, and made the quickest possible retreat, hurrying back to my camp, which I reached before dusk. The Indian who last undertook to be my guide to the trees, I sent off before gaining my encampment, lest he should betray me. How irksome is the darkness of night to one under my present circumstances! I cannot speak a word to my guide, nor have I a book to divert my thoughts, which are continually occupied with the dread lest the hostile Indians should trace me hither, and make an attack; I now write lying on the grass, with my gun cocked beside me, and penning these lines by the light of my *Columbian candle*, namely, an ignited piece of rosiny wood." — *Compan. to Bot. Mag.*, II., pp. **130**, **131**.

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* We have not found Lewis and Clarke's account anywhere cited or alluded to, except by the accurate (former) editor of the *American Almanac*, in the volume for 1838, p. 108.

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* We take this to be the correct account. But, by an error in copying, as we suppose, the length of this same tree is given at only *two hundred and fifteen feet,* in the memoir inserted in the 16th volume of the *Transactions of the Linnæan Society;* whence it has been copied into Lambert's great work on the Pines, Loudon's *Arboretum,* the *American Almanac* for 1838, and Hooker's *Flora Boreali-Americana.* There is another apparent discrepancy between the two accounts. In the *Linnæan Transactions,* the timber is said to be "white, soft, and light." In his Journal, Douglas says, the wood of the large tree he examined was "remarkably fine-grained and heavy."

It is to be regretted, although, under the circumstances, it is by no means surprising, that Mr. Douglas did not secure, at the time, complete *data* for ascertaining the age of the prostrate trunk he measured, which, as he states, was certainly not the largest he saw. But in a block from a smaller trunk, of the same species, sent to England, "there are fifty-six annual layers in a space of four and a half inches next the outside." If we suppose the large tree to have grown at an equivalent rate throughout, it must have been 1,400 years old when overthrown. But if it grew during the first century at the average rate of our White Pine for the same period, the estimate would be reduced to 1,100 years; which is probably much beneath the truth.

But the most stately tree in North America —apparently an evergreen species of *Taxodium* or American Cypress — was subsequently observed by Douglas in Upper California. "This tree," he says, "gives the mountains a most peculiar, I was almost going to say, awful appearance, — something which plainly tells that we are not in Europe. I have repeatedly measured specimens of this tree, two hundred and seventy feet long, and thirty-two feet round at three feet above the ground. Some few I saw upwards of three hundred feet high."* Truly, these are trees,

"to equal which the tallest pine,
Hewn on Norwegian hills, to be the mast
Of some great ammiral, were but a wand."

This naturally brings us to the proper North American Cypress (*Taxodium distichum*); one of the largest and most remarkable trees of our Southern States, but which appears to attain its most ample development in the *tierras templadas* of Mexico. Bartram gives a characteristic description of the tree.

> "It generally grows in the water, or in low, flat lands, near the banks of great rivers and lakes, that are covered great part of the year with two or three feet depth of water; and that part of the trunk which is subject to be under water, and four or five feet higher up, is greatly enlarged by prodigious buttresses, or pilasters, which, in full-grown trees, project out on every side to such a distance, that several men might easily hide themselves in the hollows between. Each pilaster terminates under ground in a very large, strong, serpentine root, which strikes off and branches every way just under the surface of the earth; and from these roots grow woody cones, called Cypress-knees, four, five, and six feet high, and from six to eighteen inches and two feet in diameter at their bases. The large ones are hollow, and serve very well for bee-hives! A small space of the tree itself is hollow, nearly as high as the buttresses already mentioned. From this place the tree, as it were, takes another beginning, forming a great, straight column, eighty or ninety feet high; when it divides every way around into an extensive, flat, horizontal top, like an umbrella, where eagles have their secure nests, and cranes and storks their temporary resting-places. And what adds to the magnificence of their appearance is the streamers of *long moss* that hang from the lofty limbs, and float in the winds." — BARTRAM'S *Travels through Carolina*, *Georgia*, *etc.*, p. 91.

In favorable situations, the tree sometimes attains the height of one hundred and twenty, or one hundred and forty feet, and a circumference of from twenty to forty feet, when measured quite above the singularly dilated base. This is scarcely exceeded by the largest of the celebrated Cypresses in the gardens of Chapoltepec, at Mexico, called the "Cypress of Montezuma," and which was already a remarkable tree in the palmy days of that unfortunate monarch, three and a half centuries ago. The girth of its trunk is forty-one feet, according to Mr. Ward *, or about forty-five, according to Mr. Exter; but its height is so great in proportion, that the whole mass appears light and graceful.

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* Journal of Douglas's Second Visit to the Columbia, &c., in Hooker, *Compan. to Bot. Mag.*, II., p. 150.

But this tree is greatly surpassed by the famous *Ahuehuete* (the Mexican name for the species) of the village of Atlisco, in the intendancy of Puebla, which was first described by Lorenzana, from personal observation. The worthy Archbishop says, that "the cavity of the trunk" — for the tree is hollow — "might contain twelve or thirteen men on horseback; and that, in the presence of the most illustrious Archbishop of Guatemala and the Bishop of Puebla, more than a hundred boys entered it." † The girth of the trunk, according to Humboldt, is a little over twenty-three metres, or seventy-six English feet, and the diameter of the cavity about sixteen feet. ‡

Still more gigantic — the Nestor of the race, if not of the whole vegetable kingdom — is the Cypress which stands in the church-yard of the village of Santa Maria del Tule, in the intendancy of Oaxaca, two and a half leagues east of that city, on the road to Guatemala by the way of Tehuantepec. In its neighbourhood there are five or six other trees of the kind, which are nearly as large as the "Cypress of Montezuma," but which this one as much surpasses, as that does the ordinary denizens of the forest. We possess three independent measurements of this enormous trunk. The first is that given by Humboldt, who states, probably on the authority of his informant, M. Anza, that the trunk is thirty-six metres (one hundred and eighteen English feet) in circumference. In the year 1827, Mr. Poinsett, then our minister at the court of Mexico, transmitted to the American Philosophical Society, at Philadelphia, a cord which represented the exact circumference of this tree. Its extraordinary length naturally excited some doubts as to the correctness of the measurement; and immediate application was made to Mr. Poinsett for further particulars. He accordingly transmitted a communication from Mr. Exter, an English traveller who had just returned from Oaxaca, and who had carefully examined the tree in question. Mr. Exter's letter was afterwards published in Loudon's "Magazine of Natural History"; and a French translation, accompanied by some interesting comments by the younger De Candolle, appeared in the *Bibliothèque Universelle*, for 1831.* According to Mr. Exter's measurement, the trunk is forty-six *varas* — one hundred and twenty-two English feet — in circumference; which is nearly in accordance with Humboldt's account. In neither case is the height at which the trunk was measured expressly mentioned. But this point has been duly attended to by a recent scientific observer, M. Galeotti, who visited this celebrated tree in 1839 and in 1840, and whose careful measurement gives to the trunk the circumference of one hundred and five French (equal to one hundred and twelve English) feet, at the height of four feet above the surface of the soil.† The previous measurements, therefore, were taken somewhat nearer the base. The tree as yet shows no sign of decay, although it bears less foliage in proportion to its size than its younger fellows. But we find no authority for Mr. Exter's statement, that this tree was mentioned by Cortés, and that its shade once afforded shelter to his whole European army. Perhaps he has in some way confounded it in his memory with a Cypress which the *Conquistador* passed on the march to Mexico, and which is still traditionally associated with his name.‡

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* *Travels in Mexico*, II., p. 230.

† Note to the Third Despatch of Cortes. This note is not found in Mr. Folsom's translation.

‡ *Essai Polit. Nouv. Esp.*, ed. 2, II., p. 54.

Mr. Exter reports, and the observations of recent travellers to some extent confirm the statement, that there are Cypresses near the ruins of Palenque, equal in size to the tree at Santa Maria del Tule. If this be so, they may claim a much higher antiquity than the ruins they overshadow. They must have witnessed the rise, the flourishing existence, the decline, and the final extinction of a race whose whole history has sunk into oblivion; while they are still alive!

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* Tom. XLVI., p. 387.

† *Bulletin de l'Acad. Roy. des Sciences de Bruxelles*, 1843, tom. X., p. 123.

‡ See Prescott's *History of the Conquest*, I., p. 404.

By what means can we ascertain the age of large Cypress-trees? Some years since, when Professor Alphonse De Candolle — the son and worthy successor of the botanist who has rendered that name illustrious — attempted to answer this question, the only evidence within his reach was drawn from the rate at which trees of the kind had grown in France during half a century. He inferred, that the American Cypress, in its early days, increases at the rate of about a foot in diameter every fifty years; and the estimate, although surely much too low for trees planted in favorable open situations (which have even been known to add annually an inch to their diameter for a series of years, both in Europe and in the United States), is yet quite as high as our own observations will allow for those which grow in their native forests. This rate would give to the Cypress of Montezuma the age of about seven centuries, and would render that at Oaxaca scarcely coeval with the Christian era. Perhaps this is as great an age as we are warranted in assuming for the Cypress of Montezuma; but old trunks increase so much the more slowly as they advance in age, that we must certainly assign a vastly higher antiquity to the trees of Atlisco and Santa Maria del Tule. Yet far the most important element in the calculation is wanting; namely, the actual present rate of growth of these monstrous trunks, or of other old trees of the same species. In default of this essential evidence, De Candolle has instituted a comparison between these trees and the famous Baobabs of Senegal, upon which we place no great reliance, but from which he infers, that the great Cypress of Santa Maria del Tule, if really the growth of a single trunk, is from four to six thousand years old, and perhaps dates its existence as far back as the actual creation of the world.*

We trust, that the next intelligent traveller who visits this most ancient living monument, or any other Cypress of remarkable size, will not fail to complete the evidence that is needed, as the full solution of this curious problem may throw light upon some interesting questions respecting the physical history of the world. One or more lateral incisions, not at all endangering the existence of the tree, would at once reveal its actual growth for the last few centuries. And if made at proper points, and carried to a sufficient depth, they might enable the judicious operator to disprove or confirm the surmise, that this huge bole may consist of the trunks of two or three original trees, long since united and blended into one. This conjecture is by no means very improbable, although there is nothing in the external appearance of the trunk to confirm it.*

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* Alph. De Candolle, in *Bibl. Univ.*, XLVI., p. 393. Aug. Pyr. De Candolle, *Phys. Veg.*, II., p. 1006.

Meanwhile, the Cypresses of our Southern States, although of more moderate dimensions, afford important assistance in this inquiry. It is generally known, that old trees of the kind grow very slowly ; but there are no accounts on record, so far as we can learn, respecting their rate of growth. Our own observations, though not so extended as could be wished, incline us to adopt the standard which De Candolle assumed for the Yew ; namely, the twelfth of an inch for the annual increase of old Cypresses in diameter, when growing in their native forests. But we would only apply this rule to trunks of large size, and with all the precautions that have already been mentioned ; for the Cypress grows, or at least may grow, quite rapidly for the first century or two ; but when old, it appears to increase quite as slowly as the Yew. We have counted sixty layers of the wood, in the space of an inch. A fine section of a Cypress-trunk, which grew near Wilmington, in North Carolina, now lies before us, which, on an average radius of twenty-seven inches, or diameter of fifty-four inches, exhibits six hundred and seventy annual layers. It has, therefore, grown throughout at the average rate of less than the twenty-fourth of an inch a year, measured on the radius, or the twelfth of an inch on the diameter. The trunk was thirteen inches in diameter at the expiration of its first century ; and twenty-seven inches, about the close of the second ; it added seven inches to its diameter during the third century, and a nearly equal amount during the fourth ; and for the remaining three hundred and seventy years, it grew at a still slower, but, on the whole, nearly equable rate.

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* In opposition to the remark of M. Anza, cited by Humboldt (*Essai Polit.*, the Engl. Transl., II., p. 190), we may adduce the account of Mr. Exter, and the negative testimony of M. Galeotti.

Now it is deemed a safe mode, as we have already shown, to employ the rate of growth deduced from comparatively young trees, for the determination of the age of larger and older trunks of the same species. Not only is our estimate, in all such cases, likely to fall below the truth, but the larger the trunk in question the less the danger of exaggeration. Let us apply to the Mexican Cypresses the *data* furnished by our Wilmington tree. If the Cypress of Montezuma has grown, on the average, even a little more rapidly than the trunk before us, — has increased in diameter at the mean rate of an inch in twelve years, — it must now be fully two thousand years old. But if we suppose it to have grown at twelve times this rate (which is the *maximum* for young Cypresses under the most favorable circumstances), during the whole of the first century, we should thereby reduce the estimated age to a thousand years. By the same computation, the Cypress at Atlisco would be 3,480 years old ; or 2,390 years, if we allow it the *maximum* rate of growth for the first century. So, likewise, the great Cypress at Santa Maria del Tule would be 5,124 years of age, or 4,024 years, with the aforesaid deduction. The latter accords perfectly with De Candolle's *minimum* estimate ; and is the lowest age that, in the present state of our knowledge, can possibly be assigned to this prodigious tree, upon the supposition that its trunk is really single.

We are obliged to pass unnoticed those trees of unknown species, but of surprising size, which the learned and enthusiastic Professor Martius visited in the interminable woods that border the Amazon, and of which he has recently published such a spirited account.* Their trunks were so huge, that the outstretched arms of fifteen men were required to grasp them ; and so lofty, as to mock every effort for obtaining even a leaf or flower, by which the species might be determined. As to their age, Martius offers only a conjectural estimate.

The Baobab, or Monkey-Bread (*Adansonia digitata*), of Senegal and the Cape de Verde islands, has long afforded the most celebrated instances of vegetable longevity. The tree is remarkable for the small height which it attains, compared with the diameter of the trunk or the length of its branches. Trunks which are seventy or eighty feet in circumference rise to the height of only ten or twelve feet, when they divide into a great number of extremely large branches, fifty or sixty feet in length, which, spreading widely in every direction, form a hemisphere or hillock of verdure, perhaps one hundred and fifty feet in diameter, and only seventy in elevation. To this peculiarity, rather than to the nature of the wood, which is light and soft, the great longevity of the tree is probably owing, its form opposing an effectual resistance to the tempests which would overthrow ordinary trees. Its roots spread in a similar manner beneath the surface of the soil. When laid bare by a torrent that had washed away the earth, they have been traced to a distance of more than a hundred feet without reaching their extremity. The history of these Baobabs, possibly of the very trees which Adanson's account has rendered famous, reaches back to the discovery of that part of the African coast, and of the Cape de Verde islands, by Cadamosto, in 1455 ; who, in his narrative, mentions the singular disproportion between the height and the girth of these trees.[*] But they were first fully described by the French naturalist Adanson, who examined them about a century ago. The largest trunks that Adanson measured were eighty-five feet in circumference, or twenty-seven in diameter. Golberry is said to have measured one that was over a hundred feet in girth. Quite recently, M. Perrottet has met with many Baobabs in Senegambia, varying from sixty to ninety feet in circumference, yet still in a green old age, and showing no signs of decrepitude. There can be no doubt, therefore, respecting the prodigious size which these trees attain ; and there is great reason to believe, that they are among the oldest denizens of our planet. Indeed, their age is plausibly estimated at five or six thousand years ! And the younger De Candolle has placed so much confidence in this estimate, that he has employed it as a standard of comparison, in the case of the Mexican Cypresses which we have just considered. If the evidence were really as direct as is generally thought, we could interpose no serious objection to such a conclusion. But a critical examination proves, that the whole account given by recent writers, upon Adanson's authority, is strangely at variance with his own statements.

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* *Flora Brasiliensis*, Tab. Physiog., IX. ; "*Arbores ante Christum natum enatæ.*"

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[*] “*Arbores vero ibi sunt tantæ magnitudinis, ut earum ambitus sit pedum XVII., licet eminentia altitudinis non quadret magnitudini ; non enim altius tolluntur quam pedes XX.,*” *etc.* Aloys. Cadamusti *Navig.*, c. XLIII., in Grynæus, *Nov. Orb.*, p. 45.

The current narrative is substantially and briefly as follows: — that Adanson observed, at the Madelaine islands, near Cape de Verde, some Baobab-trees of thirty feet in diameter, upon the trunks of which he found inscriptions that had been made by former visiters three centuries before; that, by cutting through three hundred annual layers, he discovered the vestiges of these inscriptions upon the wood, thus proving that they were actually made at the date assigned; that, by measuring the thickness of these layers, he ascertained the actual increase of the trunk during the last three centuries; that, having thus obtained the rate of growth in old age, and having, by actual inspection of young trunks, learned the rate of growth during the first hundred years, he deduced from these combined *data* the almost inevitable conclusion, that the trees in question were five or six thousand years old.*

Let us compare this with Adanson's own statements, from which it purports to have been taken. His first account, which comprises all the principal facts in the case, is given in the *Voyage au Sénégal*, prefixed to his volume on the natural history of that country, which was published soon after his return to France, in 1753. Adanson simply relates, that, on his visit to the Madelaine islands, he found Baobab-trees of *five or six feet in diameter*, which bore European names and dates, deeply engraven upon the bark. Two of these he took the trouble to renew, one of which was dated in the fifteenth, the other in the sixteenth century. The characters were about six inches in length, and as in breadth they occupied but a small part of the circumference of the trunk, Adanson reasonably inferred, that they were not engraven in the early youth of these trees. He had previously seen, on the island of Senegal, trees of the kind, which were sixty-three and sixty-five feet in circumference; but *he does not intimate that he inspected the layers of wood in any case.* He merely remarks, that these inscriptions might furnish some evidence respecting the age which the Baobabs sometimes attained ; "For," says he, "if we suppose that the inscriptions were engraven even in the early years of these trees, and that they have grown to six feet in diameter in the course of *two* centuries, we may calculate how many centuries they would require to attain the full diameter of twenty-five feet." * Soon afterwards, Adanson communicated to the Royal Academy of Sciences of Paris, a full account of the Baobab; which was published in the volume of Memoirs of that society for the year 1761 ; and, lastly, he wrote the article "Baobab" for the supplement to the great French Encyclopædia, published in the year 1776. These accounts, although more detailed, embody no essential additions to what has already been given. He says, that the trees in question were two in number, upon the bark of which the names of Europeans were engraved, with dates, some posterior to the year 1600 ; and others, as far back as 1555, were probably the work of those who accompanied Thevet, who, in his voyage to Antarctic lands, saw some of these trees that same year.† Some of the dates appeared to be anterior to 1500, but these were somewhat equivocal. Neglecting, therefore, the indistinct dates in the fourteenth century, continues Adanson, and even allowing that the inscriptions were made when the trees were very young, which is highly improbable, as they occupied less than an eighth of the entire circumference, it is evident, that, if the Baobab has attained six feet in diameter between 1555 and 1749, that is, in two hundred years, it would require more than eight centuries to attain the diameter of twenty-five feet, supposing the growth to continue at a uniform rate. But Adanson goes on to say, that trees grow the more slowly as they advance in age ; so that such an estimate would fall below the truth. As to its rate of growth when young, he states, that the tree acquires the diameter of an inch or an inch and a half in the first year; the diameter of a foot in ten years, and about a foot and a half in thirty years; but so far from having extended these *data*, and employed them in the manner which is attributed to him, he says, that, although it might be desirable thus to employ them, a sound geometry teaches that they are quite insufficient for the purpose. Hence, instead of attempting any precise determination, he merely offers the probable conjecture, that these largest Baobabs may have been in existence several thousand years, or nearly from the period of the universal deluge; which would give them a claim to be considered the most ancient living monuments in the world.*

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* See Alph. De Candolle, in *Bibl. Univ.*, XLVI., p. 389. Aug. Pyr. De Candolle, *Phys. Veg.*, II., p. 1003. Moquin-Tandon, *Teratol. Veg.*, p. 107.

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* *Voyage au Sénégal*, Paris, 1757, p. 66.

† "*Aupres du promontoire Verd, y a trois petites isles prochaines de terre ferme, autres que celles, que nous appellõs Isles de Cap Verd, dont nous parlerons cy apres, assez belles, pour les beaux arbres, qu'elles produissent ; toutesfois elles ne sont habitées. . . . En l'une de ces isles se trouve un arbre, lequel porte feuilles semblables à celles de noz figuiers ; le fruit est lõg de deux pieds ou envirõ, et gros en proportion,*" etc. Thevet, *Singularités de la France Antarctique :* Anvers, 1558, p. 18. Thevet proceeds to describe the fruit, its edible character, its furnishing food for monkeys, &c., so as to leave no doubt as to its being a Baobab ; and the rude woodcut which he has appended confirms his statement.

We cannot learn, that Adanson ever made any further statements upon the subject; and, as he never revisited the African coast, he cannot have collected additional facts. His original writings plainly show, that he never pretended to have obtained the *data* and made the estimates which have so long been attributed to him. To whom belongs the credit of falsifying his testimony we are unable to ascertain, as the authors above-mentioned do not cite their immediate authority; — perhaps to one M. Duchesne, whose name the elder De Candolle has casually alluded to, as having drawn up a table, exhibiting the diameter of the Baobab at different periods, doubtless upon the very plan that Adanson pointed out and condemned. We are only surprised, that such accurate and judicious writers as the De Candolles, father and son, should have relied upon second-hand authorities in any case where the originals were accessible, and especially in what they term "the most celebrated case of extreme longevity that has yet been observed with precision."†

We close our enumeration, already too protracted, with a case of longevity, perhaps transcending that of the oldest Baobabs, or of the Mexican Cypresses; namely, the famous Dragon-tree (*Dracæna Draco*) of the city of Orotava, in Teneriffe. This tree has been visited by many competent observers; and among others, by that prince of scientific travellers, the veteran Humboldt, who has given a good figure of it, as it appeared about seventy years ago, from a drawing made by M. Ozonne in 1776. A later and much fuller account was published about twenty years since, by M. Berthelot,* who has assiduously devoted many years to the study of the civil and natural history of the Canary islands; and a fine figure of the mutilated trunk, as it appeared after the terrible storm of the 21st of July, 1819, forms one of the most striking pictorial illustrations of that elaborate and excellent work, the *Histoire Naturelle des Iles Canaries*, by P. Barker Webb, Esq., and M. Berthelot.

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* *Mém. Acad. Sciences*, 1761, p. 231; and *Encycl. Suppl.*, Vol. I., p. 798.

† A passage which has met our eye in Mirbel's *Elémens de Physiologie Végétale*, I., p. 116, shows, that no such *data* as those which have been, as we suppose, falsely assumed, were known to that author down to the year 1815.

The trunk is by no means equal in size to some of the trees already noticed. It is only fifty feet in girth at the base, and not more than sixty or seventy in elevation. But, at the discovery of Teneriffe in 1402, nearly four and a half centuries ago, this Dragon-tree was nearly as large as at the present day, and had been immemorially an object of veneration among the *Guanches*. After the conquest, at the close of the fifteenth century, the trunk was employed as a boundary in dividing the lands, and as such is mentioned in ancient documents. It had changed very little since that period, except that the centre had been hollowed by slow decay, until the summer of 1819, when a third of its spreading top was carried away by a tempest. But it still continues to vegetate; and its remaining branches are still annually crowned, — as they have been each returning autumn, perhaps for *hundreds of centuries*, with its beautiful clusters of white, lily-like blossoms, — emblems of "the eternal youth of nature."

The Dragon-tree, like its allies, the Palms, and unlike ordinary trees, does not increase in diameter by annual concentric layers. The usual means of investigation are here of no account; and, apart from historic evidence, we can only form a somewhat conjectural estimate of the age of this celebrated trunk, by a comparison with young trees of the same species; which are known to grow with extreme slowness. M. Berthelot, who has attempted the comparison under the most favorable circumstances, — having lived many years upon the island, — declares, that the calculations which he has made, upon the supposition that the trunk has increased in size even at the rate of young Dragon-trees up to within the last eight hundred or one thousand years, have more than once *confounded his imagination.* We cannot but assign the very highest antiquity to a tree like this, which the storms and casualties of four centuries have scarcely changed.

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* In *Nova Acta Acad. Nat. Cur.*, XIII., (1827,) p. 781.

Upon the whole, we cannot resist the conclusion, that many trees have far survived what we are accustomed to consider their habitual duration; — that even in Europe, where man has so often and so extensively changed the face of the soil, as his wants or caprices have dictated, some trees, favored by fortune, have escaped destruction for at least one or two thousand years; while in other, and particularly in some tropical countries, either on account of a more favorable climate, or because they have been more respected, or haply more neglected, by the inhabitants, a few may with strong probability be traced back to twice that period; and, perhaps, almost to that epoch which the monuments both of history and geology seem to indicate as that of the last great revolution of the earth's surface. After making every reasonable allowance for errors of observation and too sanguine inference, and assuming, in the more extraordinary cases, those estimates which give *minimum* results, we must still regard some of these trees, not only as the oldest inhabitants of the globe, but as more ancient than any human monument, — as exhibiting a *living* antiquity, compared with which the mouldering relics of the earliest Egyptian civilization, the pyramids themselves, are but structures of yesterday.